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09/785,501	02/20/2001	Tomokazu Komazaki	32011-169878	9075

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EXAMINER
SUMMONS, BARBARA

ART UNIT	PAPER NUMBER
2817	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/785,501	Komazaki et al.
Examiner	**Group Art Unit**
Ballato Summons	2817

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 (three) MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to communication(s) filed on 2/20/01 (pre-Amdts).

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 11-46 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 11-46 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

☒ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☒ Certified copies of the priority documents have been received in Application No. 09/305,304

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☒ Notice of Reference(s) Cited, PTO-892

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Interview Summary, PTO-413

☐ Notice of Informal Patent Application, PTO-152

☐ Other _____

Office Action Summary

DETAILED ACTION

Response to Amendment

1. Regarding the amendment received 2/20/01, the amendment has been entered-in-part. Only the amendments to the claims have been entered [see the requirement for a substitute specification below].

2. The numbering of claims is not in accordance with 37 CFR § 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not). Note that although Applicants request that claims 1-11 be canceled, only claims 1-10 exist in this application (claim 11 exists only as an addition by amendment in the parent application 09/305,304), and claims 1-10 have been canceled.

Misnumbered claims 12-47 have been renumbered 11-46.

Since there are several objections to the claims below which will require claim amendments, in order to avoid possible confusion with the claims having been renumbered, the Examiner suggests that a complete copy of all of the pending claims with the proper numbering (i.e. 11-46) be provided with the response to this Office action.

Specification

3. A substitute specification excluding the claims is required pursuant to 37 CFR § 1.125(a) because the number or nature of the amendments render it difficult to consider the application or to arrange the papers for printing or copying as per 37 CFR § 1.125.

Additionally, the first line of the specification should include reference to the parent application as per the previously entered amendment also received on 2/20/01, and changes to the abstract should be made by providing a new abstract on a separate page.

A substitute specification filed under 37 CFR § 1.125(a) must only contain subject matter from the original specification and any previously entered amendment under 37 CFR § 1.121. If the substitute specification contains additional subject matter not of record, the substitute specification must be filed under 37 CFR § 1.125(b) and must be accompanied by: 1) a statement that the substitute specification contains no new matter; and 2) a marked-up copy showing the amendments to be made via the substitute specification relative to the specification at the time the substitute specification is filed.

Claim Objections

4. Claims 11, 21, 27, 33, 34, 40, and 46 are objected to because of the following informalities:

In claim 11, on line 2, "semiconductor" should be deleted because the word "semiconductor" appears nowhere in the original specification. Therefore, there is no antecedent

basis in the original specification for a "piezoelectric semiconductor substrate" (see e.g. the original spec. at page 13, the whole page, e.g., the last two lines).

In claim 11, on line 7, "SAW" (second occurrence) should be followed by --filter--.

In claim 11, on lines 8-9, it appears that the redundant second occurrence of "and a second parallel arm resonator" should be deleted.

In claim 21, on line 1, "antennal" should be --antenna--.

In claim 21, on line 3, "th" should be --the--.

In claim 27, on line 3, "second" should be followed by --layer--.

In claim 33, on line 3, "second" should be followed by --layer--.

In claim 34, on line 8, "transmittal" should be --transmitting--.

In claim 40, on line 3, "second" should be followed by --layer--.

In claim 46, on line 3, "second" should be followed by --layer--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 39 and 40 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of Claims 39 and 40 respectively recite the limitation "the branching filter circuit" in lines 1-2 and 3, respectively. There is insufficient antecedent basis for this limitation in the claim. Should claim 38 correctly depend from claim 35 rather than claim 34? The Examiner will consider claim 38 to depend from claim 35 in any art rejections that may follow.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

8. Claims 11-13 and 16-18 are rejected under 35 U.S.C. § 102(b) as being anticipated by Allen U.S. 5,726,610.

Fig. 1 of Allen et al. discloses a single chip device including a plurality of surface acoustic wave (SAW) filters 16', 16'', 18 and 42 formed on a single/common piezoelectric substrate (see col. 3, lns. 32-34), the single chip device comprising: a transmitting SAW filter 42 having first serial and parallel arm resonators connected to form a ladder filter (see e.g. Figs. 6, 8, 10 and 12);

and a receiving SAW filter 18 having second serial and parallel arm resonators connected to form a ladder filter.

Regarding claims 12 and 17, the single chip device further comprises a branching filter circuit (i.e. SAW filters 16' and 16'', see also col. 2, lns. 49-53) also formed on the common piezoelectric substrate (col. 3, lns. 32-34) and connected to the transmitting and receiving SAW filters 42 and 18.

Regarding claims 13 and 18, the branching filter circuit (i.e. filters 16' and 16'') is composed of a third serial arm resonator because the filters 16' and 16'' are also SAW ladder filters (see e.g. col. 5, lns. 44-46 with Fig. 6, and col. 6, lns. 5-7 with Fig. 8). It should be noted that the transitional phrase "is composed of" is being given a meaning broader than the closed transitional phrase "consisting of" [see MPEP § 2111.03] because Applicant's specification shows more than one "third serial arm resonator" (see e.g. TxS and RxS in Fig. 2).

9. Claims 21-25, 28, 31, 34-38, 41, and 44 are rejected under 35 U.S.C. § 102(e) as being anticipated by Ikada U.S. 6,057,744.

Figs. 3-5 of Ikada disclose a SAW duplexer. Note that although a diplexer is shown, it is disclosed that the connections can be changed such that the device is a duplexer with a transmitting and a receiving filter (see col. 9, lns. 28-36). The duplexer having an antenna terminal (corresponding to bonding pad OUT), a transmitting terminal (e.g. corresponding to bonding pad IN1) and a receiving terminal (e.g. corresponding to bonding pad IN2), comprising:

a transmitting SAW filter 22 coupled between the antenna terminal OUT and the transmitting terminal IN1; a receiving SAW filter 23 coupled between the antenna terminal OUT and the receiving terminal IN2; a common piezoelectric substrate 31 on which both SAW filters 22 and 23 are formed; and a package 35 (Fig. 5) covering the common piezoelectric substrate, wherein the antenna terminal, transmitting terminal and receiving terminal corresponding to the bonding pads on the piezoelectric substrate, although unseen in Fig. 5, are inherently formed on the package 35 for wire bonding by wires 36a and 36b.

Regarding claims 22-24 and 35-37, a branching filter circuit composed of third serial arm SAW resonators 25-27 is coupled between the antenna terminal OUT and the transmitting or receiving SAW filters 22 and 23, and the branching filter circuit is formed on the common substrate 31.

Regarding claims 25, 31, 38, and 44, the package 35 has a multi layered structure a-c.

Regarding claims 28 and 41, a frequency adjusting circuit 28 is coupled between the antenna terminal OUT and the branching filter circuit 25-27.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 14, 15, 19, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Allen et al. U.S. 5,726,610 in view of Sasaki et al. U.S. 4,910,481.

Allen et al. discloses (Fig. 1) the invention as discussed above, except for showing a frequency adjusting LC circuit formed on the common piezoelectric substrate for connection to the branching filter circuit (filters 16' and 16'').

Fig. 1 of Sasaki et al. discloses the same type of duplex communications system as Allen et al., utilizing a frequency adjusting LC circuit 2 (see col. 2, lns. 56-58) for connection to branching filter circuits 3 and 6 which precede main receiving and transmitting filters 4 and 5.

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW duplexer of Allen et al. (Fig. 1) by having provided a frequency adjusting LC circuit to be connected to the branching filter circuit (16',16'') as taught, for example, by Sasaki et al. (Fig. 1), because such an obvious modification would have provided the advantageous benefit of impedance matching between the branching filter circuit and the antenna as would have been well known by one of ordinary skill. It would have been further

obvious to one of ordinary skill that the LC circuit be formed on the same piezoelectric substrate as the filters (42,18,16',16''), based on well known obvious art recognized equivalent package design choices.

12. Claims 21, 22, 25-27, 34, 35, 38-40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ikata et al. U.S. 5,786,738 in view of Allen et al. U.S. 5,726,610.

Figs. 2 and 3 of Ikata et al. disclose a SAW duplexer having antenna terminal 36c and receiving and transmitting terminals 36a formed on a package covering the SAW duplexer comprised of transmitting and receiving SAW filters 33a and 33b connected between the antenna terminal and the transmitting and receiving terminals, respectively. Regarding claims 22 and 35, a branching filter circuit 37a and 37b is connected between the antenna terminal and the transmitting SAW filter or receiving SAW filter 33a and 33b. Regarding claims 25-27 and 38-40, as can be seen in Fig. 2B, the package is a multi layered package having a first layer substrate 32_2 disposed on a second layer substrate 32_1, and the branching filter circuit (37a,37b) is formed on the second layer substrate of the package.

However, Ikata et al. does not disclose the transmitting and receiving SAW filters formed on a common piezoelectric substrate filter chip.

Allen et al. discloses that it would have been well known to form transmitting and receiving SAW filters on the same piezoelectric substrate (see e.g. col. 3, lns. 32-34).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW duplexer of Ikata et al. (Figs. 2B and 3) such that the transmitting and receiving SAW filters would have been formed on a common piezoelectric substrate chip in view of the explicit suggestion by Allen et al. to do so (see col. 3, lns. 32-34), such being an obvious art recognized equivalent rearrangement of parts which would have provided the advantageous benefit of miniaturization of the SAW duplexer as would have been known by one of ordinary skill.

13. Claims 29, 30, 32, 33, 42, 43, 45, and 46 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ikada U.S. 6,057,744 in view of Ikata et al. U.S. 5,786,738.

Ikada '744 discloses the invention as discussed above, except for disclosing the frequency adjusting circuit 28 (Fig. 3) including a capacitance and being formed on the common piezoelectric substrate or in the multi layered package.

The Examiner takes Official notice that frequency adjusting/matching circuits containing both an inductance and a capacitance would have been a well known art recognized equivalent of the inductance only circuit of Ikada '744 and that it would have been well known to form it on the piezoelectric substrate (see the other prior art of record as evidence) or in the package layers.

Ikata et al. '738 discloses forming matching elements in the package layers as discussed above.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the duplexer of Ikada '744 (Figs. 3-5) such that the frequency adjusting circuit 28 would have also included a capacitance because such an obvious modification would have been the mere substitution of well known art recognized equivalent adjusting/matching circuits as would have been known by one of ordinary skill. It would have been further obvious to one of ordinary skill to have formed the frequency adjusting circuit on the piezoelectric substrate or on a layer of the package because Ikada '744 is silent as to the exact location of the frequency adjusting circuit 28, thereby suggesting to one of ordinary skill that it be placed any well known location such as on the piezoelectric substrate or on a layer of the package as explicitly shown by Ikata et al. '738 (Fig. 2B), such different locations representing merely a well known rearrangement of parts based on obvious packaging design choices.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lee U.S. 5,864,260 discloses a monolithic SAW duplexer and provides evidence that it is known to form a frequency adjusting matching inductor (see e.g. 430 in Fig. 6C) on the common piezoelectric substrate.

Watanabe et al. JP 7-38376 provides evidence of a frequency adjusting inductor being formed on the common piezoelectric substrate with the SAW filter as just a rearrangement of parts (see Fig. 5 vs. Fig. 4).

Takahashi U.S. 6,121,859 provides evidence that it is well known to rearrange parts by showing an inductance of a frequency adjusting matching circuit formed on a layer of a multi layered package (see 46 and 48 in Fig. 4), and by showing the alternate equivalent arrangement of the inductance on the piezoelectric substrate (see 6 and 8 in Fig. 8).

Ikada U.S. 5,936,483 and U.S. 5,966,060 were each cited in the parent application.

Kondo et al. JP 6-350307 provides evidence of matching circuits including both an inductance and a capacitance.

Hirasawa et al. JP 6-97761 and Ikata et al. U.S. 5,561,406 show other packages.

Igata et al. JP 5-167388 provides evidence that frequency adjusting circuits with an inductor only are alternate equivalents of those having both an inductance and a capacitance (see Fig. 3 vs. Fig. 5).

Hickernell U.S. 6,201,457 discloses (Fig. 6) a SAW filter 105 with a SAW resonator 102 in a branching circuit for providing better edge steepness of the filter 105 in a duplexer (Fig. 9).

Flowers et al. PCT WO 98/19394 discloses two SAW ladder filters of a duplexer formed on the same piezoelectric substrate (see Figs. 9 and 10).

15. Any inquiry concerning this communication should be directed to Barbara Summons at telephone number (703)308-4947, FAX no. (703) 308-7724, receptionist's no. (703) 308-0956.

Barbara Summons

Barbara Summons
Patent Examiner
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